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(71) Applicant  
**Roadstar (Markings) Limited**

(Incorporated in the United Kingdom)

Boothtown, Halifax, West Yorkshire, HX3 6TR,  
 United Kingdom

(72) Inventor  
**David William Richards**

(74) Agent and/or Address for Service  
**Appleyard Lees**  
 15 Clare Road, Halifax, West Yorkshire, HX1 2HY,  
 United Kingdom

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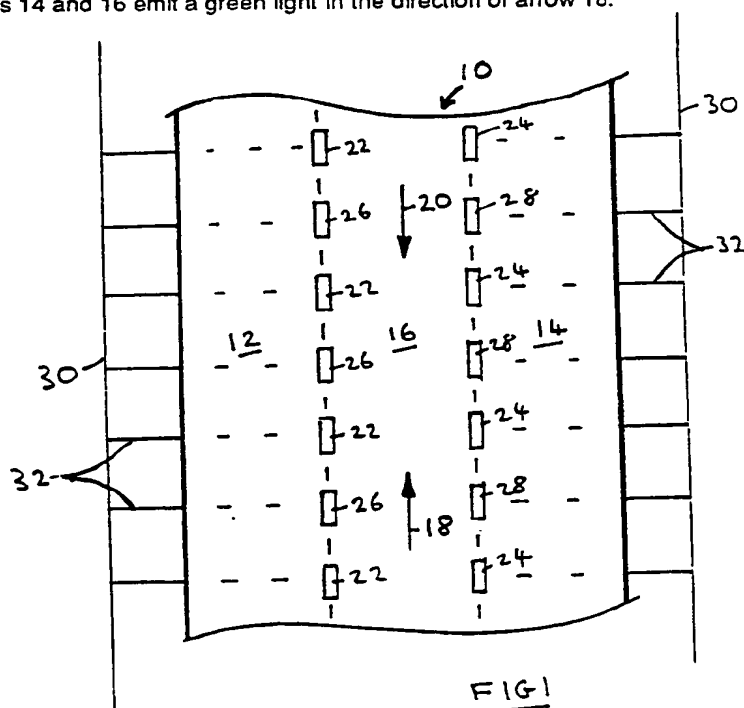
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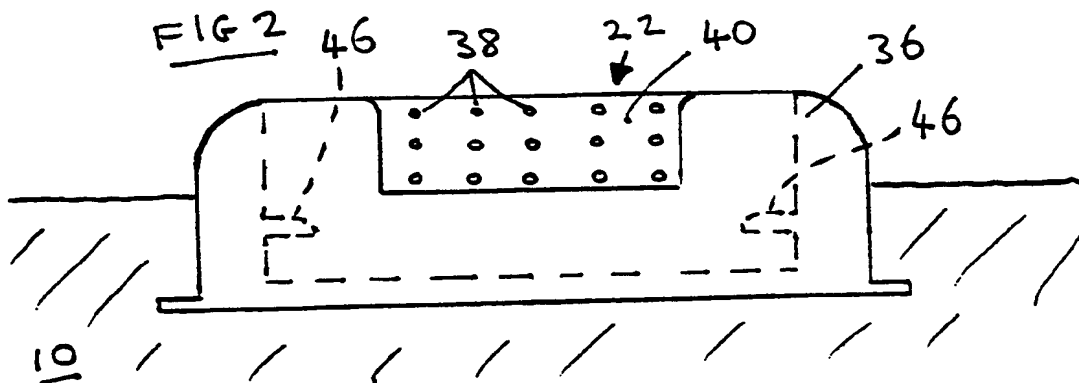
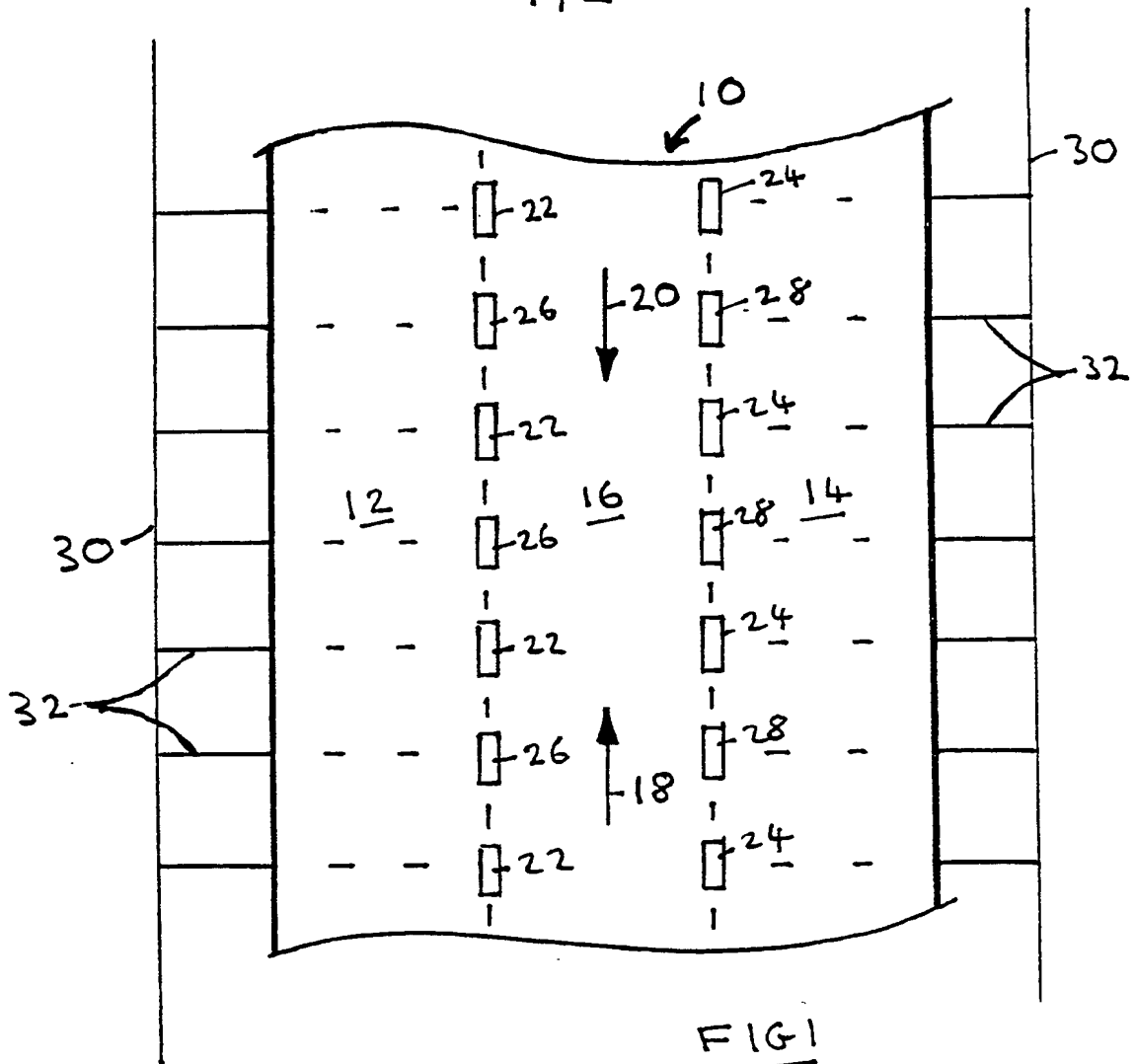
(54) **Illuminated road marker for lane control**

(57) A road 10 includes two outer lanes 12 and 14 and a central lane 16. Traffic flowing along the outer lane 12 always flows in the direction of arrow 18 and traffic flowing in the other outer lane 14 always flows in the opposite direction 20. Th traffic flowing in the central lane 16 selectively flows in one of the directions 18 or 20. When traffic in the central lane flows in the direction of arrow 18 alternative road markers 22 located between the mains 12 and 16 emit a green light in the direction 20. Alternate road markers 24 located between the lanes 14 and 16 emit a red light in the direction of arrow 20. When traffic in the central lane is to flow in the opposite direction 20 the road markers 22 and 24 are switched off and alternate road markers 26 between the lanes 18 and 16 emit a red light in both directions and alternate road markers 28 between the lanes 14 and 16 emit a green light in the direction of arrow 18.

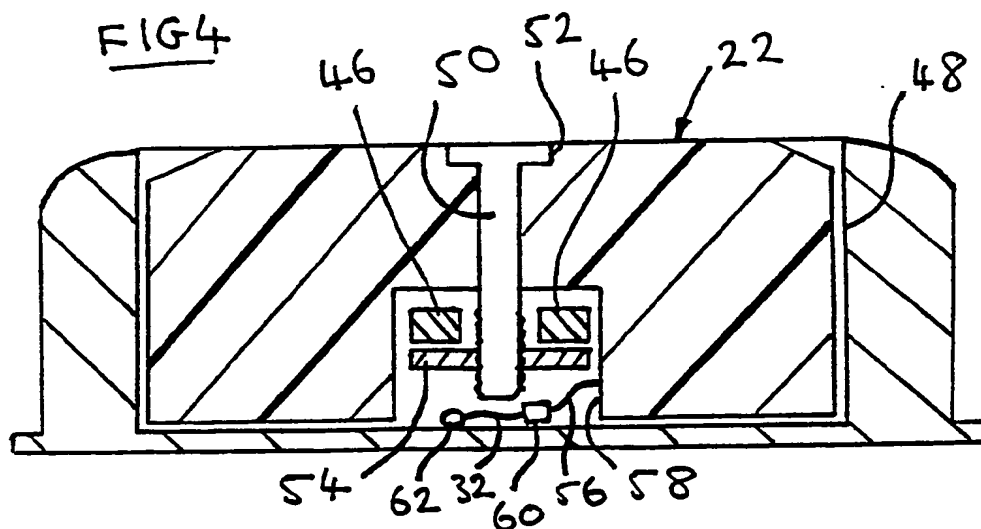
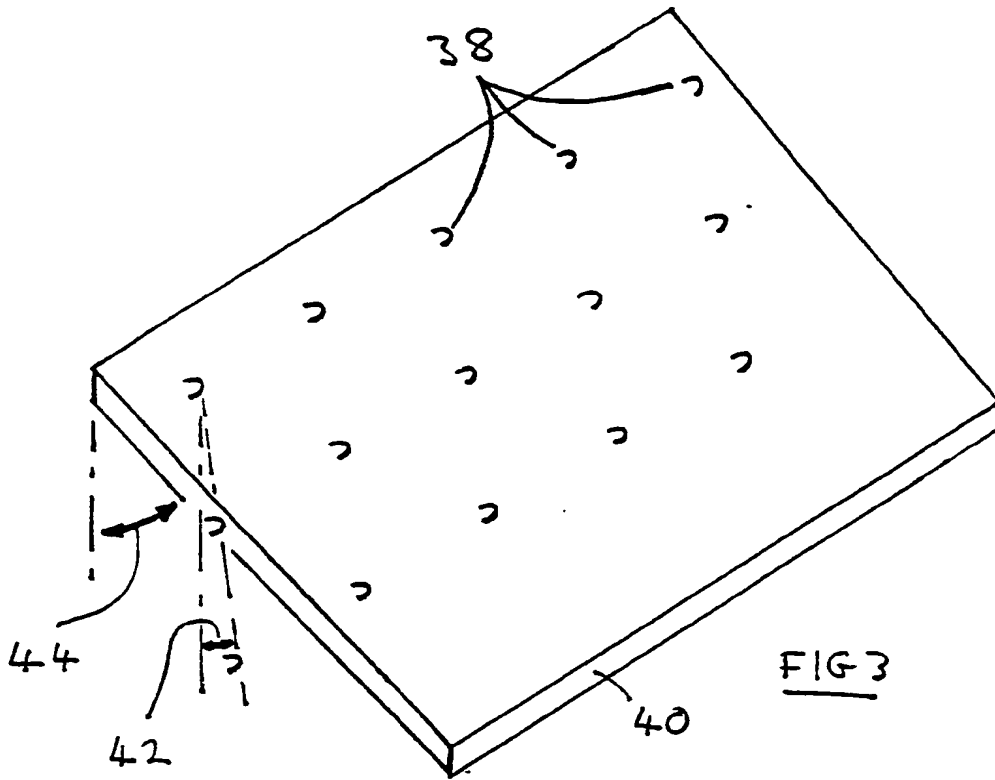


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IMPROVEMENTS IN OR RELATING TO ROAD MARKERS.

The present invention relates to improvements in or relating to road markers.

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In a known way of controlling traffic on a three lane road, for instance, traffic flow may be heavier in different directions at different times of the day. Accordingly traffic may be allowed to use two lanes in a first direction and one lane in the opposed second direction for a period and, at a different period, the traffic may be permitted to use only one lane in the first direction and two lanes in the second direction. The information to road users as to which lanes may be used is given from displays on overhead gantries which are expensive to erect and maintain and unsightly.

According to one aspect of the present invention, a road marker includes illumination means.

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The illumination means may include light emitting diodes or a semi-conductor arranged to emit light. The diodes or semi-conductors may be arranged in a substantially common plane, and the plane may be at an angle to the vertical. The diodes or semi-conductors may be arranged in an array, for example of three by five.

The illumination means may be arranged to transmit light through a translucent or transparent surface which surface may be at an angle to the vertical, and that angle may be between 20° and 55° or preferably between 30° and 45°. The transparent or translucent surface may be generally planar. When the diodes or semi-conductors are in a substantially common plane, the plane of the

transparent or translucent surface may extend in a different direction to the plane of the diodes.

Substantially the whole of the illumination means may  
5 be embedded in plastic.

Connection means may be provided to enable the road marker to be connected to a power source which connection means may be arranged to be detachable.

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The road marker may be arranged to be mounted on a housing located in a road, and the road marker may be arranged to be detachably mounted on a housing. The road marker may be arranged to be mounted on a housing adapted  
15 to receive a reflective, non illuminated road marker.

The mounting of the road marker on the housing may include connection means having a first portion arranged to hold the marker on the housing, the first portion being  
20 arranged to co-operate with a second portion, which second portion is arranged to co-operate with a downwardly facing surface of the housing. When mounting the road marker on the housing relative movement may be arranged to occur between the first and second portions, and the first and  
25 second portions may threadably engage each other. The first and second portions may be detachable from each other. The first and second portions may be separate from each other. The first portion may comprise a bolt. The second portion may comprise a nut. The downwardly facing  
30 surface of the housing may be comprised by a pair of projections arranged to extend inwardly from a socket of a housing arranged to receive the road marker. The road marker and the housing may include two connection means.

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The present invention also includes a road marker when mounted on a housing.

5 According to another aspect of the present invention,  
a method of marking a road comprises illuminating  
illumination means of a road marker. The method may  
comprise intermittently illuminating the illuminating  
means. The method may also comprise the illumination  
10 means emitting light from one direction or from opposed  
directions, in which case the colour of the light emitted  
from the opposed directions may be different.

The method may comprise emitting light from a  
plurality of spaced road markers each including  
15 illumination means.

According to a further aspect of the present  
invention, a method of marking a road includes a plurality  
of road markers each including illumination means and  
20 selectively emitting light of different colours in a first  
direction from at least some of the road markers, and  
possibly also selectively emitting light of different  
colours from at least some of the road markers in a second  
opposed direction.

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The present invention also includes a system  
including a common power source for a plurality of spaced  
road markers each including illumination means.

30 According to a further aspect of the present  
invention a method of replacing a road marker mounted on  
a housing in the road comprises detaching a first road  
marker from the housing and connecting a further road  
marker including illumination means to a power source and  
35 mounting the further road marker on the housing. Th

method may comprise detaching the first road marker from the housing and disconnecting the first road marker from a power source.

5           According to another aspect of the present invention, a method of controlling traffic flow comprises emitting light in a first direction from at least some road markers located between a first and second lane in order to indicate that traffic flowing in a second direction along  
10 the first lane, which second direction is opposed to the first direction, may not cross from the first lane to the second lane. The method may further comprise emitting different light in the first direction from at least some road markers located between the first and second lanes in  
15 order to indicate that traffic flowing in the second direction along the first lane may cross from the first lane to the second lane.

          The method may further comprise emitting light in the  
20 second direction from at least some of further road markers located between the second lane and a third lane on the other side of the second lane to the first lane, which light from the further road markers indicates that traffic flowing in the first direction along the third  
25 lane may not cross into the second lane. The method may further comprise emitting different light from at least some of the further road markers in the second direction in order to indicate that traffic flowing in the first direction along the third lane may cross over into the  
30 second lane.

          Light may also be emitted from at least some road markers located between the first and second lanes in the second direction in order to indicate to traffic flowing  
35 in the first direction in the second lane that it may not

cross into the first lane. Similarly light may be emitted from at least some of the further road markers in the first direction in order to indicate to traffic flowing in the second direction in the second lane that it may not cross over into the third lane.

The present invention includes any combination of the herein referred to features.

The present invention may be carried into practice in various ways, but one embodiment will now be described by way of example and with reference to the accompanying drawings, in which:

Figure 1 is a schematic plan view of a road including a plurality of road markers;

Figure 2 is a front view of a road marker located in a housing;

Figure 3 is a schematic perspective view showing the location of an array of light emitting diodes of a marker, and

Figure 4 is a schematic sectional view showing the details of the mounting of a road marker in a housing.

As shown in Figure 1, the road includes two outer lanes 12 and 14 and a central lane 16. The traffic flowing along the outer lane 12 always flows in the direction of arrow 18, and the traffic flowing in the other outer lane 14 always flows in the opposite direction 20. The traffic flowing in the central lane 16 selectively flows in one of the directions 18 or 20.



When the traffic in the central lane 16 flows in the direction of arrow 18, alternate road markers 22 located between the lanes 12 and 16 emit a green light in the direction 20, indicating to traffic travelling in the direction 18 that they may cross over to the central lane. Alternate road markers 24 located between the lanes 14 and 16 emit a red light in the direction of arrow 20 indicating to traffic flowing in the direction 18 that they may not cross over into the lane 14. At the same time, the road markers 24 also emit a red light in the direction 18 indicating to traffic in the lane 14 travelling in the direction 20 that they may not cross over into the central lane 16.

When the traffic in the central lane is to flow in the opposite direction 20, the road markers 22 and 24 are switched off and alternate road markers 26 between the lanes 18 and 16 emit a red light in both directions, indicating that traffic flowing in both directions may not cross between the lanes 16 and 18. At the same time alternate markers 28 between the lanes 14 and 16 emit a green light in the direction of arrow 18 indicating that traffic flowing in the lane 14 in the direction of arrow 20 may cross over into the central lane.

Thus the road markers 22 and 28 can emit a green light in one direction only, and the road markers 24 and 26 can emit a red light in both directions.

The sequence of illumination is thus for road markers 22 and 24 to be ON, then for the road markers 24 and 26 to be ON (to emit red in all directions from between all lanes to give time for traffic to vacate the central lane) and then for the road markers 26 and 28 to be ON.

Any or all of the markers can flash for all or part of the time for which they are ON.

The road markers are each connected to a power line 30 via feeder lines 32, and a controller timer 34 controls the sequence of illumination.

Figure 2 is a schematic front view of a road marker 22 mounted in a cast iron housing 36 which is embedded in the road 10. The housing 36 is a conventional housing such as traditional self wiping reflecting road markers sold under the Registered Trade Mark CATS EYE can be mounted in. Light is emitted forwardly and upwardly from an array of light emitting diodes 38 through a transparent plate 40 of light density plastics. Alternatively or additionally, light may be emitted thorough a semiconductor or semi-conductors.

The diodes 38 are shown in greater detail in Figure 3 comprising an array of five by three diodes in a common plane at an angle 42 of approximately  $6^{\circ}$  to  $8^{\circ}$  to ensure that the light is emitted upwardly as well as forwardly. The transparent plate 40 is at an angle 44 of between  $20^{\circ}$  and  $55^{\circ}$  and preferably between  $30^{\circ}$  and  $45^{\circ}$  to inhibit dust accumulating over the surface.

The mounting of the road marker 22 on the housing 36 is shown in detail in Figure 4.

The housing 36 includes a pair of fingers 46 directed into a socket 48 of the housing from opposed sides of the socket (the location of both pairs is seen in Figure 2, but only one pair is shown in Figure 4). A bolt 50, the head 52 of which is received in a recess on the upwardly facing surface of the marker, extends between the fingers

46 and threadably engages a threaded plate 54 extending across and beneath the fingers. As the bolt is tightened the plate 54 engages the underside of the fingers to bring the marker down into the socket and retain the marker in the housing.

The marker includes a plastic moulding which holds the components of the marker in place and maintains them watertight. A lead 56 extends from a recess 58 in the underside of the marker to a connector 60 which is detachably connected to the feeder line 32 which enters the housing through an opening 62.

In order to insert a marker, the connector 60 is first attached to the line 32 before the bolts are attached to the plates 54. In order to remove a marker, for instance for replacement, the bolts 50 are detached from the plate 54 before disconnecting the connector 60.

The top of the marker is flush with the top of the housing and, if desired, the top of the marker may be provided by a wear resistant stainless steel plate.

It will be appreciated that existing housings having self wiping reflective road markers can be converted to have illuminated markers without necessarily removing the housing from the road.

Although the present invention has been described with reference to the direction of traffic flow in lanes, it will be appreciated that the illuminated markers could be used in other instances such as selecting a path for vehicles to follow at ports.

CLAIMS

1. A road marker including illumination means.
- 5 2. A marker as claimed in Claim 1 in which the illumination means includes light emitting diodes.
3. A road marker as claimed in Claim 1 or 2 in which the illumination means includes a semi-conductor arranged to  
10 emit light.
4. A marker as claimed in Claim 2 or 3 in which the diodes or semi-conductors are arranged in a substantially common plane.  
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5. A road marker as claimed in Claim 4 in which the plane is at an angle to the vertical.
6. A road marker as claimed in any of Claims 2 to 5 in  
20 which the diodes or semi-conductors are arranged in an array.
7. A road marker as claimed in Claim 6 in which the array comprises three by five.  
25
8. A road marker as claimed in any preceding claim in which the illumination means is arranged to transmit light through a translucent surface.
- 30 9. A road marker as claimed in any preceding claim in which the illumination means is arranged to transmit light through a transparent surface.
10. A road marker as claimed in Claim 9 or 10 in which  
35 the surface is at an angl to the vertical.

11. A road marker as claimed in Claim 10 in which the angle is between 20° and 25°.

5 12. A road marker as claimed in Claim 9 or 10 in which the angle is between 30° and 45°.

13. A road marker as claimed in any of Claims 9 to 12 in which the transparent or translucent surface is generally planar.

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14. A road marker as claimed in Claim 14 when dependent on Claims 4 or 5 in which the substantially common plane of the diodes or semi-conductors extends in a different direction to the plane of the transparent or translucent surface.

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15. A road marker as claimed in any preceding claim in which substantially the whole of the illumination means is embedded in plastics.

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16. A road marker as claimed in any preceding claim including connection means to enable the road marker to be connected to a power source.

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17. A road marker as claimed in Claim 16 in which the connection means are detachable.

18. A road marker as claimed in any preceding claim arranged to be mounted on a housing located in a road.

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19. A road marker as claimed in Claim 18 in which the road marker is arranged to be detachably mounted on a housing.

20. A road marker as claimed in Claim 18 or 19 which is arranged to be mounted on a housing adapted to receive a reflective, non-illuminated road marker.

5 21. A road marker as claimed in any of Claims 18 to 20 in which the mounting of the road marker on the housing includes connection means having a first portion arranged to hold the marker on the housing, the first portion being arranged to co-operate with a second portion, which second  
10 portion is arranged to co-operate with a downwardly facing surface of the housing.

22. A road marker as claimed in Claim 21 in which, when mounting the road marker on the housing relative movement  
15 occurs between the first and second portions.

23. A road marker as claimed in Claim 22 in which the first and second portions threadably engage each other.

20 24. A road marker as claimed in any of Claims 21 to 23 in which the first and second portions are detachable from each other.

25 25. A road marker as claimed in Claim 24 in which the first portion comprises a bolt.

26. A road marker as claimed in Claim 24 or 25 in which the second portion comprises a nut.

30 27. A road marker as claimed in any of Claims 18 to 26 in which the downwardly facing surface of the housing is comprised by a pair of projections arranged to extend inwardly from a socket of a housing arranged to receive the road marker.

28. A road marker as claimed in any of Claims 21 to 27 in which the housing includes two connection means.

5 29. A road marker as claimed in any of Claims 1 to 28 when mounted on a housing.

30. A road marker substantially as herein described with reference to, and as shown in the accompanying drawings.

10 31. A system including a common power source for a plurality of spaced road markers as claimed in any of Claims 1 to 30.

15 32. A method of marking a road comprising illuminating illuminations means of a road marker.

33. A method as claimed in Claim 32 comprising the illumination means emitting light from one direction.

20 34. A method as claimed in Claim 32 comprising the illumination means emitting light from opposed directions.

25 35. A method as claimed in Claim 34 in which the colour of the light emitted from the opposed directions is different.

30 36. A method as claimed in any of Claims 32 to 35 comprising emitting light from a plurality of spaced road markers each including illumination means.

35 37. A method of marking a road including a plurality of road mark rs each including illumination m ans comprising selectively emitting light of different colours in a first dir ction from at least some of the road markers.

38. A method as claimed in Claim 37 comprising selectively emitting light of different colours from at least some of the road markers in a second opposed direction.

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39. A method of marking a road substantially as herein described with reference to, and as shown in the accompanying drawings.

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40. A method of replacing a road marker mounted in a housing in the road comprising detaching a first road marker from the housing and connecting a further road marker including illumination means to a power source and mounting the further road marker on the housing.

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41. A method as claimed in Claim 40 comprising detaching the first road marker from the housing and disconnecting the first road marker from a power source.

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42. A method of replacing a road marker substantially as herein described with reference to, and as shown in the accompanying drawings.

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43. A method of controlling traffic flow comprising emitting light in the first direction from at least some road markers located between a first and second lane in order to indicate to traffic flowing in a second direction along the first lane, which second direction is opposed to the first direction, information relating to the permitted movement of that traffic.

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44. A method as claim d in Claim 43 in which the method further comprises emitting different light in the first direction from at least some road markers located between th first and second lanes in ord r to indicate th

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different information relating to the permitted movement of traffic flowing in the second direction along the first lane.

5 45. A method as claimed in Claim 43 or 44 comprising  
emitting light in the second direction from at least some  
of further road markers located between the second lane  
and a third lane on the other side of the second lane to  
10 the first lane which light from the further road markers  
indicates information relating to the permitted movement  
of that traffic flowing in the first direction along the  
third lane.

15 46. A method as claimed in Claim 45 comprising emitting  
different light from at least some of the further road  
markers in the second direction in order to indicate  
information on permitted movement to traffic flowing in  
the first direction along the third lane.

20 47. A method as claimed in any of Claims 43 to 46 in  
which light is emitted from at least some road markers  
located between the first and second lanes in the second  
direction in order to indicate information on permitted  
movement to traffic flowing in the first direction in the  
25 second lane.

30 48. A method as claimed in Claim 47 in which light is  
emitted from at least some of the further road markers in  
the first direction in order to indicate information on  
permitted movement to traffic flowing in the second  
direction in the second lane.

35 49. A method of controlling traffic flow substantially as  
herein described with reference to, and as shown in the  
accompanying drawings.

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